Nanisha X. Ross

From:	Will Greene
Sent:	Thursday, March 3, 2022 3:34 PM
To:	Nanisha X. Ross
Subject:	FW: my responses
Attachments:	Lazar responses to ACC questions on DR.pdf

E-01345A-21-0087

Nanisha,
See another response attached, for docketing in the three DSM/EE dockets.
Best,

Will Greene
Policy Advisor to
Commissioner Sandra Kennedy
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wgreene@azcc.gov

From: Jim Lazar <jim@jimlazar.com>
Sent: Thursday, March 3, 2022 12:15 AM
To: Will Greene <WGreene@azcc.gov>
Subject: my responses

My responses to the generic questions are attached.

If you can submit it into the record based on this, please do.

If not, let me know exactly what I need to do.

--
Jim Lazar
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Olympia, WA 98501
360-786-1822

"I do not feel obliged to believe that the same God who has endowed us with sense, reason, and intellect has intended us to forgo their use."

-- Galileo Galilei
Letter to the grand duchess Christina (1615)

ACC - Docket Control - Received 3/16/2022 9:37 AM
ACC - Docket Control - Docketed 3/16/2022 9:56 AM

Questions to all interested parties

A. Respond to the concept of making utility demand response programs "opt-out" rather than "opt-in," with phased implementation and clear avenues for customers to decline participation if they so choose. Please provide any estimates you may have of increased participation and total savings potential if an opt-out framework was used.

Programs involving flexible end uses, such as electric vehicle charging, swimming pools, and water heating should be opt-out programs, with mandatory curtailment in the event of system stability issues. The logical approach to these is to provide a significant discount for allowing load flexibility, coupled with significant surcharges for over-riding. For example, if the standard rate is $0.16/kWh, customers could receive half-price for providing flexible load, but pay 4X the standard rate when they over-ride a curtailment.

Programs involving customer comfort are another matter. In the future, when all thermostats are "smart" and connected, then mandatory participation during periods of system stability should also be imposed, because the alternative is complete curtailment, which is worse than partial curtailment (changed thermostat setting).

If Texas had been able to limit thermostats to 50 degrees during the 2021 freeze, no one's pipes would have burst, and it is likely no one would have suffered the other serious economic and health consequences of that insufficiency.

B. Please address any significant challenges facing the expansion of demand response programs such as the physical installation of smart devices, the lack of necessary smart grid infrastructure, or customer communication hurdles.

Each utility is unique in this regard. There are plenty of smart thermostats and controller devices available for discrete loads, ranging from radio controls to smart circuit breakers. There should be no technical obstacles to making all large discrete loads (HVAC, water heat, clothes dryers, hot tubs, EV chargers and pool pumps) available for load flexibility programs.

C. Are there other demand side management programs similar to Cool Rewards and Peak Solutions which may benefit from an opt-out structure?

EV charging is a key option that will become very important over the next decade. The "easy thing" to do with an EV is to come home after work and plug in. Uncontrolled, this presses the early evening peak higher. But the EV can wait to charge if it will not be used again, or has enough reserve range remaining.

Duke Energy, Xcel Minnesota, Austin Energy, Burbank Water and Power, and other utilities have rolled out very creative programs that incorporate advantageous pricing with load flexibility for EV charging.

D. In addition to smart thermostats enabling HVAC participation in demand response, what other devices could be integrated in to a demand response program to enable the participation of resources such as water heaters, electric vehicles, pool pumps, or any other potential customer load sources?

The primary residential load missing is clothes dryers, which draw about 3 kW, and in most cases, are a flexible load. There are rare circumstances when a particular shirt or other garment must be dried "now" but in most cases people have enough socks and underwear and other clothing to make clothes drying flexible. Because electric clothes dryers operate on dedicated 240V circuits, smart circuit breakers and smart plugs are options for controlling this load.

Ranges are also a large load, but interfering with food preparation is probably further than any utility should go in seeking load flexibility.

E. Respond to the concept of creating "tiered" participation levels, allowing customers who grant the utility or third-party aggregators greater ability to make adjustments (increased quantity of program "event days" lucrative payment.

Tiered participation can take two forms.

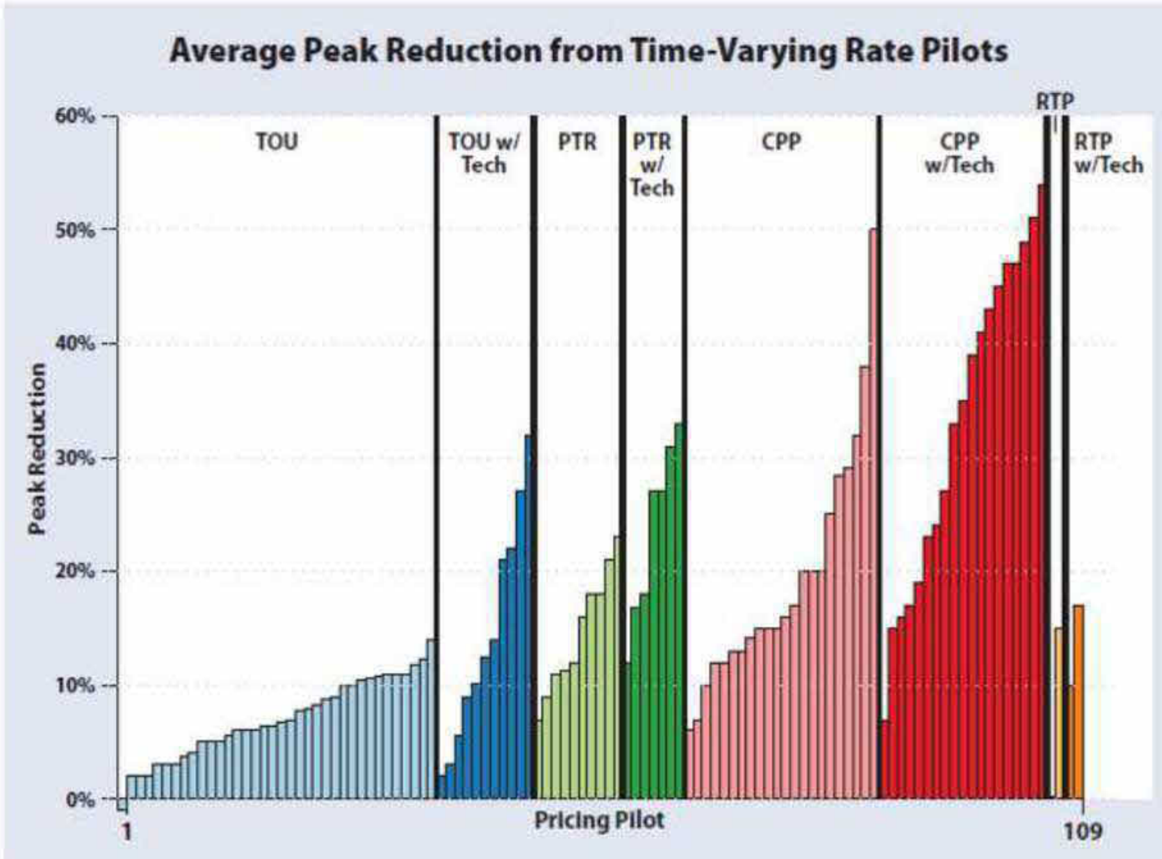
First, customers may make one level of participation available for hundreds of hours a year (avoiding high-cost energy), and a second level for dozens of hours a year (system stability). An example would be allowing 4 degrees of HVAC flexibility every day, but 10 degrees of HVAC flexibility for system stability events.

A second approach is enrolling some loads in cost-control programs, deployable at any time, and additional loads in system stability programs, deployable only when reserves reach unacceptable levels.

A third approach is to provide technology support so that participation is hands-free for the consumer for certain enrolled devices.

A fourth approach is the opposite of demand response: incentive pricing for load reduction. The Peak Rewards program of Baltimore Gas and Electric, with automatic rebates of $1.25/kWh for all curtailment during a called event, but no surcharges or controls, has actually worked better than analysts and economists expected.

The graphic below, from Time Varying and Dynamic Rate Design (www.raponline.org) shows the levels of peak curtailment that different pricing approaches have produced.



F. Respond to the concept of an "extreme grid stress" status in these programs, used only on days similar to the 2020 summer heat storm which presented imminent threat of rolling blackouts and regional grid instability. On these rare days, the utility or third-party aggregator would have greater ability than the "default" setting to adjust thermostats or other connected devices to prevent grid collapse. Describe any customer protections necessary to ensure the utilities cannot abuse this mechanism.

There are several options for system stress situations. The worst is complete rolling blackouts.

One good option is temporary rationing. If customers exceed 5 kW of demand at any time, for more than 15 minutes, or consumption of more than 25 kWh in a day, they are curtailed for one hour. People will learn from this pretty quickly. The capacity subscription programs in France and Italy are good examples. This should allow people to maintain livable temperatures (90 degrees or less), use electronics, lighting, and other small appliances, but have very limited HVAC, water heat, swimming pool, or laundry capabilities.

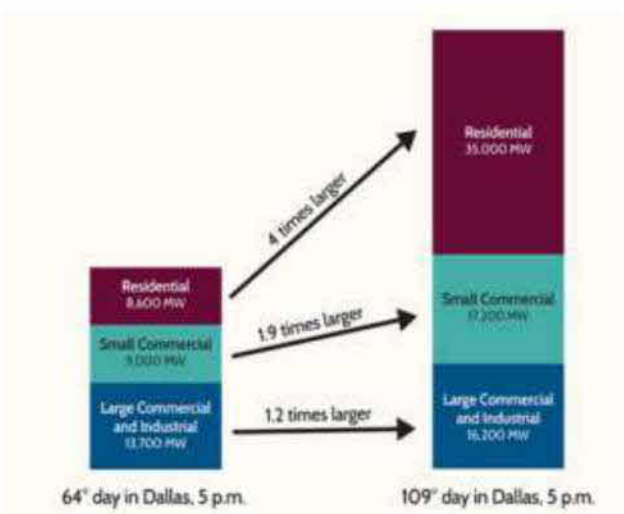
The Texas freeze was not a "capacity" limitation, but rather an "energy" limitation – there was not enough fuel available to run all of the available power plants all of the hours that customers wanted. Temporary rationing would address this. It was used by LADWP during the second oil embargo with excellent results. Customers not curtailing monthly usage by at least 15% were subject to a sharp surcharge. LADWP achieved over 20% reduction in usage.

A second option for system stress is direct control of all non-essential loads. This would include direct curtailment of water heat, laundry equipment, pool pumps, spas, and temperature control of HVAC equipment.

A way to implement this is with utility service standards: requiring that all discrete loads over a certain size be addressable by the utility or the appropriate aggregator. Just as utilities now have rules regulation power factor and harmonics, rules could be established making control of key loads a condition of service.

In new construction, direct control of key loads or circuits could be made a part of the service connection requirement. Over time, this can be extended to existing customers.

The role of space conditioning in driving peak demand cannot be overemphasized. The graphic below shows that extremely hot days result in a quadrupling of residential load on the hottest days. While some of this may be people drinking more cold lemonade, and higher refrigerator usage, nearly all of the change is space conditioning. The experience in Texas in 2021 shows that the same is true for extremely cold days.



G. Describe the pros and cons of utilizing third party aggregators for demand response programs rather than relying solely on the utilities for program implementation and operation.

Many third party aggregators already have a strong customer relationship. This includes cellular companies, cable TV companies, Google, Apple, and others. Piggybacking on this relationship may be a huge cost savings.

The only "con" is that the load reductions (and load enhancements: remember that there will be times when the system is flooded with PV generation) must be there when called upon. That can be satisfied with financial instruments, or, ultimately, with direct curtailment of the customer's meter (assuming the utility meters have remote shut-off capability). The threat of full curtailment is a powerful influence.

H. Should customers enrolled in demand response programs who choose to override/refuse the utility's request to reduce this demand on "event days" receive reduced payment"

Yes. The simple solution is to offer a discount for controllable loads, and a surcharge for any overrides. For example, 50% off for controllable loads, 400% of standard rates for overrides.

Some operators have found that allowing a few overrides a year improves customer acceptance, with trivial impacts on program performance. Examples include the Green Mountain Power EV smart charging pilot and the Bonneville Power Administration Smart Hot Water pilot.

I. Respond to the concept of incentivizing that natural gas - based residential and commercial/industrial uses be replaced with electric equipment within demand response programs and how this might be accomplished. An example might be incentivizing replacement of an aging gas furnace with an electric heat pump plus smart thermostat enrolled in a demand response program.

In order to reduce carbon emissions, eventually natural gas distribution systems must be retired. The time to do this is when individual laterals are reaching the end of their operational lifetime. It is important to be prepared to serve nearly all load with electricity on the day the line is retired (a few customers will need to be shifted to propane on the day of cutover).

Requiring joint integrated resource planning between electric and gas utilities, so that both utilities coordinate on deployment is critical. That is a project beyond the scope of a DR docket. But, the gas utility must identify when circuits are likely to need to be retired, and the electric utility needs to have adequate capacity (substation, primary circuit, transformers) in place to accommodate customers switching to electric heating well in advance of gas lateral retirement. Initially this will not be a problem in most areas, because Arizona is so strongly summer-peaking. But in time, it will be an issue in more and more locations, starting with higher altitude locations like Flagstaff.

All new heating and cooling equipment should be fitted with smart controls, as a condition of service, in the utility rules and regulations.

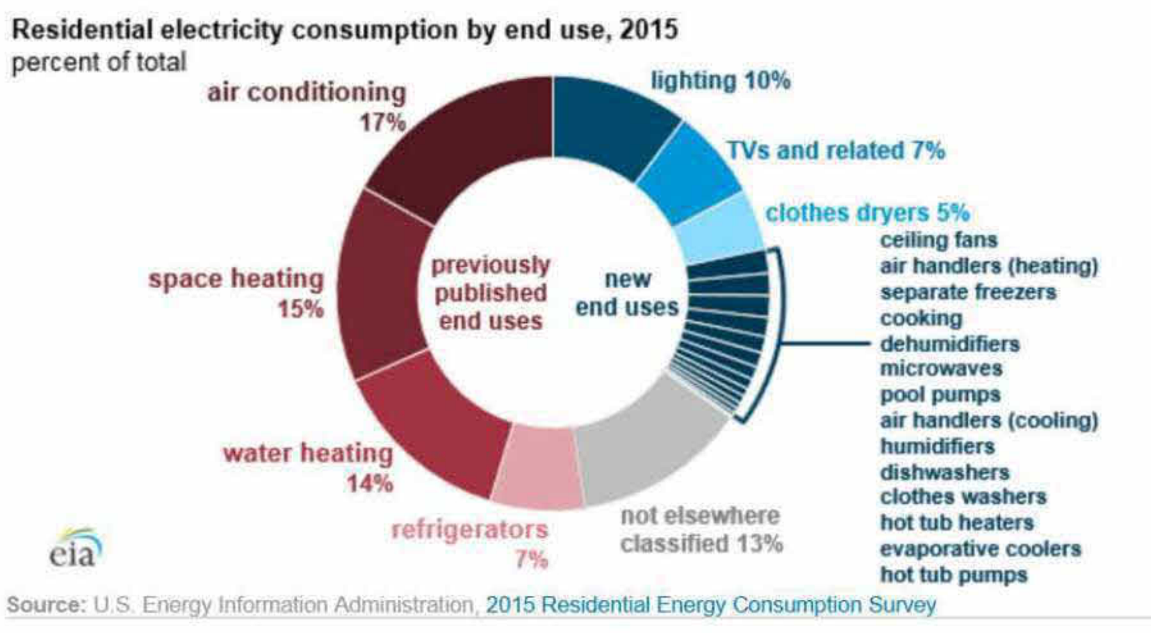
J. Please describe the pros and cons of implementing a program described in "I" above.

The big advantage of a phased conversion is that neither the electric utility nor the gas utility makes investments that will become uneconomic. The gas utility stops maintaining a lateral, knowing that the load will migrate. The electric utility invests in capacity upgrades and load flexibility knowing that the heating and water heating load will migrate.

K. In an ideal-but-achievable scenario, what percentage of a utility's peak load should be "controllable" via demand response programs and what are estimated timelines needed for implementation to meet these levels?

The graphic below, from USEIA, shows residential usage by end use.

100% of water heating load, 100% of clothes drying load, 100% of pool and spa load, and 100% of EV charging load should be controllable. 50% of space heating and cooling load should be controllable (that is, the thermostats should be remotely adjustable to 50% of uncontrolled usage). This adds up to about 25% - 40% of total residential load, and more like 50% of residential peak demand. This percentage will rise as EV charging becomes more common. Small appliances, lighting, cooking, refrigerators and freezers, and office and entertainment equipment should be exempt, but scheduling these loads should be encouraged by time-varying or dynamic rate design.



L. Please feel free to provide any other guidance which may help the Commission in this matter.

I have attached a copy of Teaching the Duck to Fly, a set of strategies to match loads to resources and resources to loads. This docket shows that Arizona is a leader in implementing the strategies discussed in this guide.